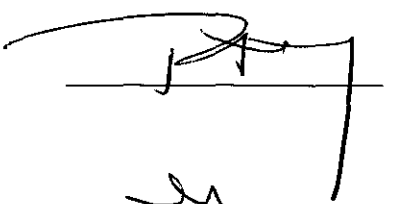
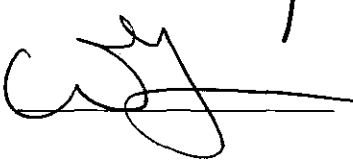
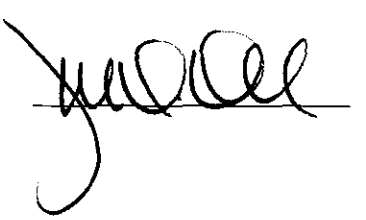
Corrective Action Plan

For

Assistance Visit
Control of Hazardous Energy - Lockout/Tagout and Fall Protection at
Thomas Jefferson National Accelerator Facility
August 28-31, 2006

Submitted By: Bob May  Date: 12/20/06

Reviewed by: Craig Ferguson  Date: 12/20/06

Approved by: Michael Dallas  Date: 12/21/06

Summary Discussion

On August 28-31, 2006, ORNL staff provided support for TJSO staff during an assistance visit. The visit focused on JLab implementation of controls for Hazardous Energy, specifically Lockout/Tagout, and on Fall Protection. A report on these activities was provided to TJSO on November 8, 2006 forwarded to JLab on the same date.

Seven findings (FIND), nine observations (OBS), and two noteworthy practices (NP) were identified during the review:

The LOTO Findings are presented below in brief along with a summary response. The detailed response for each finding and a reply to each observation is found in Attachment 1.

- FIND-01 (LO/TO) The LO/TO Program does not meet all of the Occupational Safety and Health Administration (OSHA) and National Fire Protection Association (NFPA) 70-E requirements.

  Response: Based on self-identified findings unrelated to this assistance visit, the JLab ESH&Q Associate Director has assigned a newly hired (October 2, 2006) Electrical Safety Engineer to the position of Subject Matter Expert (SME) for LOTO at JLab. The SME participated in the development of this Corrective Action Plan. As mentioned below, the SME will systematically retrain all staff and subcontractors with LO/TO Training to the new EH&S Manual Chapters.

- FIND-02 (LO/TO) Based on interviews with site personnel, there was confusion and misunderstanding concerning the LO/TO training. In addition, certification of LO/TO training that includes each employee's name, the date of training, and the employer certification is not maintained per the requirements of 29 Code of Federal Regulations (CFR) 1910.147(c)(7)(iv)

  Response: The ESH&Q AD disabled on-line training. All subsequent training has been "classroom" training conducted by the SME and supporting ESH&Q Staff. The SME also acted on recommendations from a LOTO Ad Hoc Improvement Committee regarding ESH Manual Chapter 6110 and revised the chapter to eliminate much of the confusion underlying the LOTO findings. The LOTO SME also worked with the ESH&Q Health and Safety Dept. Head to remove what has been referred to as Administrative LOTO from Chapter 6110 to a new EH&S Manual Chapter 6111 (Administrative Configuration Control). Once Chapters 6110 and 6111 are published, all staff and subcontractors with current LO/TO Training will be systematically retrained in a classroom setting to the requirements. Currently, every instance of LO/TO training completion is entered into and tracked by both JList and Aspen.

- FIND-03 (LO/TO) The annual LO/TO inspection for 2005 was not performed in accordance with 29 CFR 1910.147(c)(6)(ii) and 29 CFR 1910.147(c)(6)(i)(D).

  Response: The SME is has reviewed all LOTO Management Self Assessments conducted in 2006 and will conduct the annual LO/TO inspection for 2006 by the end of the calendar year. The inspection report will contain a summary of information

generated by the LOTO Management Self Assessments. Annual LOTO inspection coordination has been assigned to the LOTO SME.

- FIND-04 (LO/TO): How to over-lock a LO/TO with personal locks and how to verify that voltage has been removed is confusing. Some workers appear to check absence of voltage at motor leads. This approach does not meet the requirements of 29 CFR 1910.333(b)(2)(iv); 29 CFR 1910.333(b)(2)(iv)(A); 29 CFR 1910.333(b)(2)(iv)(B).

  Response: Based on the language on page 2 of the report, it is assumed that the assessor was concerned that a maintenance worker may not be checking for system de-energization at the (correct) lockout point. Retraining resulting from newly revised LOTO Chapters 6110, 6111, will include sections that address known areas of confusion including proper de-energization test points and over-locking Admin. LOTO.

The Fall Protection Findings are presented below in brief:

- FIND-01 (FP) All TJNAF personnel using personal fall arrest systems have not been fully trained on the limitations, selection maintenance, and the use and storage of fall arrest systems. The training provided has not been certified as required by the applicable standards. (29 CFR 1926.503(a) and (b), American National Standards Institute [ANSI] Z359.1, Section 7.3)

The JLab Training Consultant will work with the MHSR to evaluate existing training and further develop training as needed. The JLab Training Consultant will manage associated training records for training provided by the MHSR for fall protection and aerial work platforms.

- FIND-02 (FP) Personnel suspended in a personal fall arrest harness can quickly experience significant medical problems, and planning for the timely rescue of personnel suspended in a personal fall arrest system is not being completed. A Task Hazard Analysis is not routinely completed to address rescue or self-rescue methods. (29 CFR 1926.503(d)(20), TJNAF Environment Health & Safety (EH&S) Manual Appendix 6131-T1)

The finding related to Personnel suspended in a personal fall arrest harness does not specify what "timely rescue" means. Neither does OSHA. Its "Suspension Trauma / Orthostatic Intolerance Safety and Health Information Bulletin" SHIB 03-24-2004, states that death may occur within 30 minutes for a victim. Based upon many responses by Newport News Fire and Emergency Medical Services - drills and actual emergencies - we can be assured of 10-minutes or less for professional rescuers on the scene. In addition, the same OSHA bulletin notes that moving a suspended victim to a horizontal position should be done only while vital signs are monitored and that cardiac distress may occur in some instances as pooled blood returns to the heart. The Lab's plan for emergency medical response involves professional Newport News Fire and Rescue (NNFR) personnel at Station 6 nearby. Ten minutes is a very reliable response time. Regular joint exercises are conducted with Station 6. We currently rely on off-site Fire and Rescue Services for emergency rescue. The Emergency Manager and the JLab Occupational Medicine Physician JLab will schedule a joint exercise that

will involve a rescue from a simulated arrested fall with possible orthostatic injury. This will test the NNFR capability to respond to a “fall arrest event” and minimize orthostatic injury.

- FIND-03 (FP) The Fall protection net used at the Free Electron Laser (FEL) facility is not being load tested or certified at each installation as required. (29 CFR 1926.105(c)(1) and .502(c)(4); ANSI A10.11, Section 9, and the User Instruction Manual).

In response to the findings associated with JLab’s Fall Protection program, the fall protection net used at the FEL has been removed. If reused, it will be reinstalled according to manufacturer’s requirements, load tested in accordance with OSHA requirements, and staff will be trained in its use by the Materials Handling Safety Representative (MHSR).

In summary JLab believes that the conditions that generated the findings will be adequately addressed by the actions taken or actions planned. Corrective action tracking system entries related to the JLab response to items in Attachment 1 will be entered by January 19, 2007.

Lockout Tagout			
Finding #	Finding Description	JLab Reply	CATS #
01	The LO/TO Program does not meet all of the Occupational Safety and Health Administration (OSHA) and National Fire Protection Association (NFPA) 70-E requirements.	See below	
(a)	Locks – Personal, Administrative, Department, Group are confusing and do not meet the requirements of 29 CFR 1910.147(c)(5)(ii)(B)	OSHA Maintenance LOTO requirements and Administrative Lock Out / Tag Out requirements are being separated into two ESH&Q Manual Chapters, 6610 and 6111 respectively. Chapter 6111, Administrative Configuration Control, simplifies, clarifies, and reinforces "admin LOTO" requirements. After publication, all currently trained staff will be retrained to the new chapters.	
(a)i.	Locks are not controlled (they are lying around with tags within some facilities).	Retraining will include a section on the proper use and storage of LOTO locks. See FIND-01(a)	
(b)	Tags – The use of Administrative and Personnel tags do not meet all of the OSHA requirements as identified in 29 CFR 1910.147(c)(5)(ii)(A)(2); 29 CFR 1910.147(c)(5)(ii)(D); 29 CFR 1910.147(c)(7)(ii)(C)	Retraining will include a section on the requirement for legible lock and tag labeling. Retraining will include a section on the proper use and storage of LOTO locks. See FIND-01(a)	
(b)i.	Tags have the names and dates marked out and reused.	See action regarding FIND-01(b) above	
(c)	Use of locks without a tag and the use of tags without a lock is not well defined as identified in OSHA 29 CFR 1910.147(c)(7)(ii); 29 CFR 1910.147(c)(5)(ii)(A)(2); 29 CFR 1910.147(c)(5)(ii); 29 CFR 1910.333(b)(2)(iii)(D); 29 CFR 1910.333(b)(2)(iii)(E)(2).	ESH&Q Manual Chapter 6110 in action rewrite (in FIND-01(a)) contains clear language on requirements for the use of locks with and without tags. This language conforms to 1910.333(b)(2)(iii)(E).	
(d)	Confusion about the Group LO/TO program is evident throughout TJNAF.	Retraining will include a section that addresses known areas of confusion regarding Group LOTO. See FIND-01(a)	
(d)i.	As stated in interviews some people think they are required to put their personal locks in the group lock box. [From Report 2. Summary of Results, 2.1 Procedures: Some employees think that the individual puts his personal lock keys in the lockbox, and one person then overlocks the lockbox.]	See above Action regarding FIND-01(d) above	
(d)ii.	The use and the purpose of group LO/TO are confusing to the employees and do not meet the requirements of 29 CFR 1910.147(f)(3)(i).	See above Action regarding FIND-01(d) above	
(e)	There appears to be confusion throughout TJNAF about verification	See above Action regarding FIND-01(d) above	

	of LO/TO.		
(e)i.	The approach being used does not meet the requirements of 29 CFR 1910.333(b)(1); 29 CFR 1910.147(c)(4)(ii)(D); 29 CFR 1910.147(d)(6). For example, overlocking a disconnect that has already been locked out with an administrative lock using a personal lock without verifying that the correct circuit is de-energized.	See above action regarding FIND-01(a). Also, retraining will include a section that addresses known areas of confusion regarding LOTO and specifically addresses the requirement to verify that a system is deenergized at the proper electrical connections prior to work performed on a system over-locked with an Admin Control LOTO.	
(f)	The use of a person to monitor the controls of a crane so another person can work from the crane does not meet the requirements of LO/TO as addressed in 29 CFR 1910.147(a)(3)(i).	When a crane is used to provide a fall protection attachment point, LOTO or an equivalent crane controller key lock is used to disable the equipment or otherwise prevent unexpected energization. When the crane is used to manipulate a bosons chair, the controls must be manipulated to position the worker. There are special procedures and controls for this activity.	
	During interviews, it was evident that the Kirk Key system has been used in the past for LO/TO. The current TJNAF procedure does not allow use of the Kirk Key system for LO/TO; however, the LO/TO draft procedure does indicate that use of the Kirk Key system would be adequate to meet the requirements of OSHA's LO/TO. The use of a Kirk Key system for LO/TO does not meet the requirements of 29 CFR 1910.333.(b)(2)(ii)(B).	Kirk key manufacturer states, "…Interlocks are applicable to practically any field wherein human life or property is endangered by an improper operation or improper sequence of operations." 29CFR1910.147 (c)(2)(i) states, "If an energy isolating device is not capable of being locked out, the employer's energy control program under paragraph (c)(1) of this section shall utilize a tagout system." For JLab LOTO applications, the Kirk key system is suitable for use as an additional safety measure implemented to provide protection during a tagout under 29CFR1910.147 (c)(2)(ii).	
02	Based on interviews with site personnel, there was confusion and misunderstanding concerning the LO/TO training. In addition, certification of LO/TO training that includes each employee's name, the date of training, and the employer certification is not maintained per the requirements of 29 Code of Federal Regulations (CFR) 1910.147(c)(7)(iv).	Retraining will include a section on the proper use and storage of LOTO locks. See FIND-01(a). In addition, Aspen is used to identify JLab personnel (supervisors and staff) who are trained in LOTO. A supervisor identifies the training requirement in an employees individual training plan and the employee takes the approved training course: SAF-104.	
(a)	The web-based training did not work effectively.	Web based training has been discontinued until it can be made consistent with new ESH&Q Manual Chapters and made to run reliably on lab supported PC platforms.	
(b)	Several people interviewed expressed concerns about the web-based training.	See above action regarding FIND-02(a).	
(c)	The requirements to become a person who can perform LO/TO are not explained in detail in the training reviewed.	See above action regarding FIND-02(a). Training materials in the instructor taught course clearly identify what is requirements to conduct LOTO.	
(d)	Several people expressed concerns	The instructor is the JLab Subject	

	about the way questions were answered in the classroom training and were confusing to the student.	Matter Expert. Students are given ample opportunity to discuss questions in class. The SME will explore the utility of an ad hoc LOTO committee consisting of safety and engineering staff to resolve any open questions about LOTO applications.	
03	The annual LO/TO inspection for 2005 was not performed in accordance with 29 CFR 1910.147(c)(6)(ii) and 29 CFR 1910.147(c)(6)(i)(D).	The SME is will review all LOTO Management Self Assessments conducted in 2006 and is conducting an annual LO/TO inspection for 2006 with EHS&Q staff support. Annual LOTO inspection coordination has been assigned to the LOTO SME.	
04	How to over-lock a LO/TO with personal locks and how to verify that voltage has been removed is confusing. Some workers appear to check absence of voltage at motor leads. This approach does not meet the requirements of 29 CFR 1910.333(b)(2)(iv); 29 CFR 1910.333(b)(2)(iv)(A); 29 CFR 1910.333(b)(2)(iv)(B).	It is not clear from the report exactly what system or event the assessors were referring to. Based on the language on page 2 of the report, it is assumed that the assessor was concerned that a maintenance worker may not be checking for system de-energization at the (correct) lockout point. See also FIND-01(e)(i).	

Fall Protection			
Finding #	Finding Description	JLab Reply	CATS #
01	All TJNAF personnel using personal fall arrest systems have not been fully trained on the limitations, selection maintenance, and the use and storage of fall arrest systems. The training provided has not been certified as required by the applicable standards. (29 CFR 1926.503(a) and (b), American National Standards Institute [ANSI] Z359.1, Section 7.3)	The JLab Training Consultant will work with the MHSR to evaluate existing training and further develop training as needed. The JLab Training Consultant will manage associated training records for training provided by the MHSR for fall protection and aerial work platforms.	
02	Personnel suspended in a personal fall arrest harness can quickly experience significant medical problems, and planning for the timely rescue of personnel suspended in a personal fall arrest system is not being completed. A Task Hazard Analysis is not routinely completed to address rescue or self-rescue methods. (29 CFR 1926.503(d)(20), TJNAF Environment Health & Safety (EH&S) Manual Appendix 6131-T1).	Moving a suspended victim to a horizontal position should be done only while vital signs are monitored. Newport News Fire and Rescue (NNFR) personnel at Station 6 are trained in rescue techniques and have a reliable ten-minute response time to JLab. The JLab Emergency Manager and JLab Occupational Medicine Physician JLab will schedule an exercise involving a simulated arrested fall rescue.	
03	The Fall protection net used at the Free Electron Laser (FEL) facility is not being load tested or certified at each installation as required. (29 CFR1926.105(c)(1) and .502(c)(4); ANSI A10.11, Section 9, and the User Instruction Manual).	Fall protection net was removed and will be reinstalled and load tested under the direction of an engineer before next use. The Materials Handling Safety Representative (MHSR) will train staff on its use before the next use. No other similar equipment on site.	

LOTO			
Observation #	Finding Description	JLab Reply	CATS #
01	Several times, statements were made that "it costs too much to have people (LO/TO) verify LO/TO on systems" or "it costs too much to buy new tags." LO/TO must be performed in accordance with the OSHA requirements regardless of the cost. The cost issue was discussed several times in the OSHA LO/TO preamble, and it was an unacceptable reason for not following the standard.	See FIND-01(a). Retraining will address the requirements for the use of tags.	
02	Modifications of electrical panels to allow a hasp to be installed so a person could use a lock on the breaker have been made throughout the Laboratory. However, no documentation from the manufacturer was available to show approval for this modification.	The SME, as Chair for the Electrical Safety Committee, has evaluated this situation. According to meeting minutes, the committee recommends that the panel covers be replaced (hasps removed) and that reliable LOTO devices be procured for use on the breakers. Cost and schedule are being evaluated.	
03	It was noted during interviews that the Chairperson for the (LO/TO) LO/TO Committee stated he was not trained in LO/TO.	Based on self-identified findings unrelated to this assistance visit, the JLab ESH&Q Associate Director has assigned a newly hired (October 2, 2006) Electrical Safety Engineer to the position of Subject Matter Expert (SME) for LOTO at JLab. The LO/TO Committee was Ad Hoc and recommendations are under review by the SME.	

Fall Protection			
Observation #	Finding Description	JLab Reply	CATS #
01	Based on information received during the interviews, implementation of proper fall arrest system use is not fully adequate.	The MHSR will evaluate activities requiring fall protection and partner with ESH&Q staff to train staff to fall protection requirements found in SAF-302. The Training Committee under the direction of the JLab Training Consultant will evaluate the need for a separate fall protection training program.	
02	A personal fall arrest system consists of all components used to arrest a person from a fall at a working height. All components of the fall arrest system (e.g., anchor connectors, retracting wire cable or web lanyards, rail or beam anchors, and cross-arm straps) are not inspected annually by a competent person. (ANSI Z359.1, Section 6.1)	The MHSR inspects personal fall arrest systems/components annually and maintains records of this inspection.	
03	The Material Handling Safety Representative is not issuing aerial	The impact to Chapter 6147 regarding removal of the Material	

	work platform operators a "Jefferson Laboratory Material Handing License." (TJNAF EH&S Manual, Chapter 6147)	Handling Licenses for operators, will be evaluated by the chapter author and the chapter will be updated accordingly.	
04	Documentation and appointment of competent persons for the erection and inspection of scaffolds is incomplete. Only one of the four individuals identified as a competent person had attended the "Scaffold Competent Person Training Course." Scaffold inspection checklists should be enhanced to provide a place for documentation of daily inspections.	See also reply for Fall Protection FIND-01. The JLab Training Consultant will evaluate those identified at JLab as OSHA competent persons for relevant qualifications and modify Aspen to track skills associated with qualifications. OSHA does not require daily scaffold inspections. The requirements for inspections are addressed in ESH Manual Chapter 6132.	
05	A boatswain's chair has been used for access to equipment in Hall B for approximately five years beyond the manufacturer's recommended service life. In addition, the OSP for the boatswain's chair work activity should be upgraded to capture all operational requirement for lifting personnel identified in 29 CFR 1926.550, as well as specifying that the fall arrest lanyard be attached to an independent anchor point meeting the criteria for a fall arrest anchor.	ESH&Q Staff will review the existing technical work document for the use of the bosons' chair for compliance with OSHA requirements and update the document as needed.	
06	Personnel were observed using portable ladders inappropriately (i.e., using a step ladder to access an area where it was not tall enough or configured appropriately to access and standing above the designated rung on a step ladder).	Proper ladder use will be reinforced through safety briefings routinely presented at JLab and the material will be made available for use by line managers on the ESH&Q website.	